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Forest Health Technology ENTERPRISE TEAM UPDATE

PUBLISHED BY THE USDA FOREST SERVICE FOREST HEALTH TECHNOLOGY ENTERPRISE TEAM

SUMMER 1998

Steering Committee: Strong commitment

The Forest Health Technology Enterprise Team's Steering Committee convened its annual meeting in Fort Collins in May 1998. Throughout the meeting, steering

Committee members demonstrated their strong commitment to actively advising and assisting the team.

In her opening remarks, Ann Bartuska, Director for Forest Health Protection (FHP), emphasized that she relies on the committee to advise the Team, to assist it in keeping on track, to encourage it to stretch into new work areas and avoid stagnation, and to serve as a "sensing point" and provide connections so that the Team can learn of entrepreneurial opportunities.

The Team highlighted its activities since last year's meeting; the Committee then formulated recommendations for future Team efforts.

The Committee encouraged the Team to consider planning and decision making in the context of the three types of work conducted

See **Steering**, page 2



Enterprise Team Steering Committee. Back row, left to right: Jerry Boughton, Tom L. Thompson, Christopher Risbrudt, Wray Freeman, John Walstad, R. Scott Cameron, Bill Dickerson, Ernest Delfosse. Front row, left to right: Michael Orazo, Gerry Hertel, Greg Fitch, Pete Roussopoulos, Ann Bartuska, Allan T. Bullard, Borys Tkacz. Not shown: Janet Anderson, Elizabeth Chornesky. See sidebar on page 2 for Steering Committee members' titles and agency affiliations.

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Battle of the bugs: Team helps control imported pest

The pink hibiscus mealybug, *Maconellicoccus hirsutus* (Green), is common in tropical Africa, Southeast Asia, India, parts of the Middle East, and northern Australia. Despite its wide distribution, until recently this

mealybug had achieved pest status only in Egypt and India. But its identification for the first time in the Caribbean in 1994 was the start of something big. By October 1995, the pink hibiscus mealybug had spread



Parasite wasp (*Anagyrus kamali*) attacks mealybugs

See **Battle of the Bugs**, page 4

Steering, from page 1

by the Enterprise Team: Directed, Core, and Business.

Examples of directed activities are management of the National Agricultural Pesticide Impact Assessment Program, the Special Technology Development Program, and similar administrative support for national programs that the Forest Health Protection Director assigns to the Team.

FHP-sponsored core programs are those sponsored specifically as service and technology development for FHP programs. Core programs are funded entirely by FHP base funding to the Team.

Business activities are sponsored by clients; that is, these activities and projects are driven by client needs and either cost-shared or reimbursed by client funds. The Committee determined that decisions to accept such projects need to remain business decisions, exercised at the discretion of the team management and directors.

Committee recommendations:

- In the Operations Review scheduled for October 1998, address the vitality and effectiveness of current management approaches to

applications development technologies.

- Identify creative approaches to augmenting support services for personnel management and acquiring additional federal positions (Full Time Equivalent allocation).
- Clearly organize and communicate activities in groupings consistent with the strategic plan goals and general work areas: Information Services, Technical Support Services, Training and Education, Technology Development, Methods Improvement, and Management of National Programs.
- Describe and adopt a formal process for broad review across the country, especially by Regional FHP Directors, when the Team considers making a major focus shift or undertaking a major initiative.

The Committee expressed clear concern for the potential effects of a broad review process on project selection and emphasized the Team's need to clarify and maintain direction to build capacity, technology, or both. It further emphasized that the Team must balance long-term, risk-taking projects with the short-term

objectives frequently associated with entrepreneurial jobs.

Balancing entrepreneurial work and sustained core programs has presented the Enterprise Team with streams of small and large decision points that affect each project leader and every team and group member almost daily. As a result of concerns

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Forest Health Technology Enterprise Team Steering Committee

Janet Anderson, U.S. Environmental Protection Agency

Jerry Boughton, USDA Forest Service, Alaska Region State and Private Forestry

R. Scott Cameron, Union Camp Corporation

Elizabeth Chomesky, Nature Conservancy

Ernest Delfosse, USDA Agricultural Research Service

Bill Dickerson, North Carolina Department of Agriculture

Greg Fitch, New Mexico Forestry Division

Wray Freeman, South Carolina Forestry Commission

Gerry Hertel, USDA Forest Service, Northeastern Area State and Private Forestry

Michael Oraz, National Biological Control Institute

Christopher Risbrudt, USDA Forest Service, Director, Ecosystem Management

Pete Roussopoulos, USDA Forest Service, Director, Southern Research Station

Tom L. Thompson, USDA Forest Service, Rocky Mountain Region Regional Forester's Office

John Walstad, Oregon State University



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Steering, from page 2

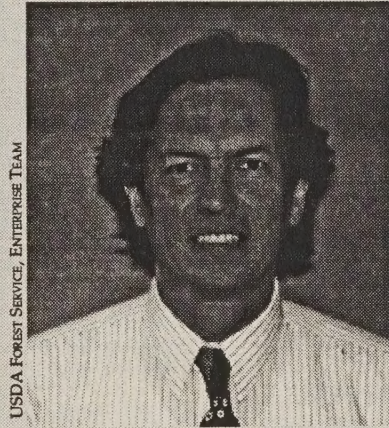
expressed during the review of the Enterprise Team's Strategic Plan, members of the Committee further recommended:

- Although the volume of funds generated by entrepreneurial work is satisfactory, the Team's emphasis should be on the nature of the work being done, not on percentage targets.
- The Team must sustain its core competencies, or it won't be able to attract any reimbursable work.
- The Team needs to be positioned to sustain long-term vision and capacity rather than focusing on short-term projects to bring in funds.
- The Team needs a "naysayer"; although a project may be appealing from the standpoint of goodwill, contacts, or funding, the Team may need to reject it in order to sustain long-term goals and core competencies.

Because some of the cost-reimbursable projects undertaken by the Enterprise Team have resulted in increased volume of contracted work, the Enterprise Team indicated that during the past year, its capacity to manage contracted projects has been limited by the number of federal employees on staff. A similar limitation was noted as a significant factor for another enterprise team sponsored by Chris Risbrudt, this year's chairperson on the Steering Committee, and Director of Ecosystem Management. (Risbrudt sponsors a 100%-enterprised team providing Content Analysis Services to Forest Service offices assessing public input to forest and ecosystem plans.) After some discussion, the Steering Committee agreed to author a request to the Chief of the Forest Service that the

Acting Director Tkacz: Team on right track

Recently the Update interviewed Borys M. Tkacz, Acting Director of the Enterprise Team-Fort Collins. Before coming on board as Acting Director, Borys had worked with the Enterprise Team on several projects in his position as Arizona Zone Leader for Entomology and Pathology in Flagstaff, AZ. We were interested in his impressions of the Enterprise Team from two perspectives: That of Acting Director and that of forest health professional who uses the Enterprise Team's products and services in performing his duties in the field.



Borys S. Tkacz, Acting Director, Enterprise Team-Fort Collins

Update: What services and products of the Enterprise Team have been most useful to you in your field position?

Tkacz: A variety of them. I used the full gamut of Enterprise Team products and services, from remote sensing, photo acquisition, and airborne videography, to model development and maintenance, database development, information display, and GIS services.

Update: Would these services be useful to other land managers in the field?

See Tkacz, page 8

current limitation on full-time equivalent ceilings for enterprise teams be relieved or eliminated in order to enable effective groups to grow more dynamically in response to successful enterprises.

The Committee elected Ernest Delfosse as its next chairperson. The next meeting of the Steering Committee will be held in Morgantown, West Virginia, in May 1999. The session should extend for one and a half days and include a visit to facilities and staff.

In closing, Bartuska observed that the Steering Committee has really come together, with the most obvious interest in active involvement and action to date. Committee members strongly

endorsed both continuing the once-a-year meeting and engaging the Steering Committee (individually or collectively) throughout the year. The Committee's message to the Team: "Don't hesitate to call on us, based on our contacts, association, interests, or expertise, as needed, for us to be helpful to you throughout the year. We will happily contribute our thoughts and advice whenever you come to a 'fork in the road' and can benefit from our contacts with others and our experiences."

The Enterprise Team extends its sincere thanks to Steering Committee members for their time, attention, encouraging words, and candid advice.

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Battle of the bugs, from page 1

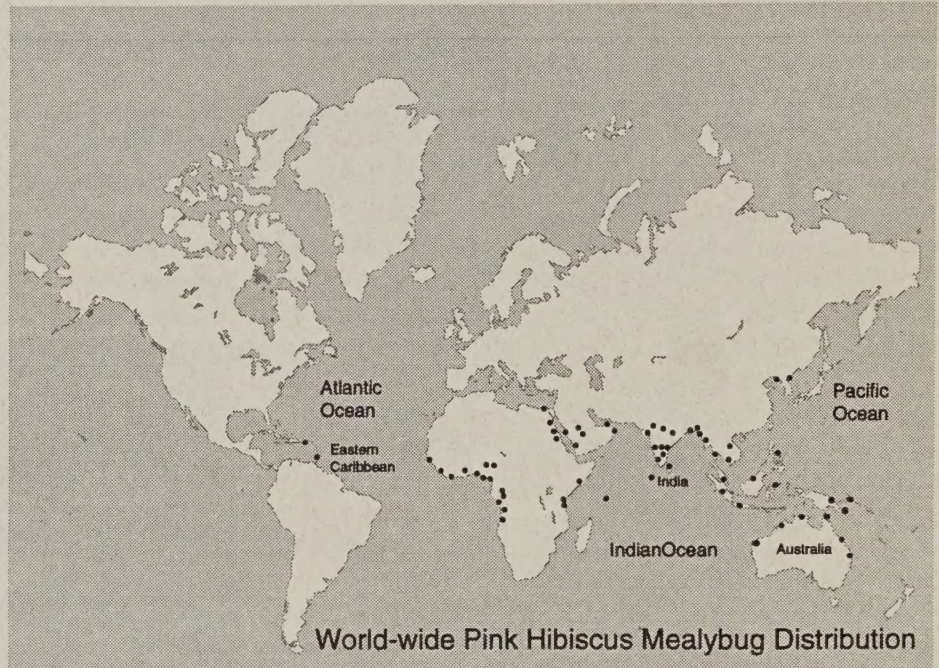
across much of the island of Grenada, damaging ornamental, agricultural, and horticultural plants as well as plantation and natural forest trees. By 1996, it had spread to three Caribbean Islands; by August 1997, it was present on 16 of them. (Worldwide distribution of the pink hibiscus mealybug is shown in the map at right.)

The insect's expansion is not expected to stop in the Caribbean. Pests similar to this one have spread into the U.S. along the South American-Caribbean-Florida route. The pink hibiscus mealybug poses a direct threat to the tropical and subtropical areas of the United States, where it could affect the agricultural and ornamental plant industries.

Avoiding tremendous environmental and economic losses will require effective management of the current infestation in the U.S. and British Virgin Islands and Puerto Rico. The Enterprise Team has joined other U.S. Government agencies in the biocontrol aspects of this effort.

The pink hibiscus mealybug is known to attack more than 125 plant species (see table, bottom of page 5). The mealybug can be found on the stems, leaves, buds, fruit, and roots of host plants. It will feed on the soft tissues of most plants; as it feeds, it injects toxic saliva. These activities can kill susceptible host plants; they also cause malformed leaves and fruit, and stunt terminal growth (see photo at right).

But that's not all. The pink hibiscus mealybug excretes a syruplike honeydew which, in turn, encourages the development of black sooty mold. In some plants,



World-wide Pink Hibiscus Mealybug Distribution
AFTER A MAP CREATED BY CAB INTERNATIONAL IN "THE PINK MEALYBUG IN THE CARIBBEAN," A FACT SHEET PUBLISHED BY THE REGIONAL ACTION PROGRAMME FOR CONTROL OF THE PINK MEALYBUG

the mold can cause considerable secondary damage; it prevents photosynthesis from taking place in the leaves, further stunting growth.

The creature that causes all this damage is not much to look at. The

wingless adult females are oval and 1-3 millimeters long. Although they are pink in color (hence the "pink" classification), they appear white because they congregate in groups to lay eggs and then cover themselves and the eggs in a cottony white waxy or mealy material. When infestation becomes serious, this cottony substance begins to look like snow, as it gathers on all parts of the plant. The waxy coating protects the insect; it prevents many pesticides from being effective.

The females lay 300-500 eggs and have a life cycle of 24-30 days, depending on prevailing environmental conditions. The eggs and young nymphs are also pink. They can be seen more clearly when the white covering is gently brushed off with the flat of the hand.

Male mealybugs are slightly greyer than the females and have wings. In heavily infested areas, they can be



REGIONAL ACTION PROGRAMME FOR CONTROL OF THE PINK MEALYBUG

Infested hibiscus plant shows curling leaves and stunted terminal growth. Pink hibiscus mealybug adult females and eggs covered with waxy white secretion encrust the stem.

See **Bugs**, page 5

Bugs, from page 4

easily seen at dawn and dusk as they fly among plants. They are smaller than the egg-filled females.

Pink hibiscus mealybugs, particularly the nymphs, are easily spread. They can be carried on the wind and by rain as well as by hitching rides on birds, ants, clothing, and vehicles. In fact, humans serve as great friends to mealybugs by carrying infested plant material from one end of a farm to the other, or even across the country.

One reason for the rapid spread of the pink hibiscus mealybug in the Caribbean is the scarcity of natural enemies in that part of the world. Biological control of the insect involves both identifying native species of natural enemies and introducing exotic species from its homeland. The most promising parasite for introduction, *Anagyrus kamali*, is a small wasp brought into the Caribbean from China and Hawaii. It is fairly host-specific; that is, it actively seeks out pink mealybugs and lays its eggs inside them. As its young hatch, they feed



USDA APHIS

Adult female pink hibiscus mealybug, *Maconellicoccus hirsutus* (Green) (at center) with egg masses and immatures.

on the mealybug. The adult wasps also destroy mealybugs by puncturing the adults and feeding on their body fluids. A factor that makes *A. kamali* an effective biocontrol agent for mealybug is its typical 15-day life cycle in tropical climates. *A. kamali* produces two generations for each generation of the mealybug.

Another parasite, *Gyranusoidea indica*, imported from Egypt, is also

being evaluated.

A natural enemy native to the Caribbean is the ladybird beetle, *Cryptolaemus montrouzieri*. It feeds on pink hibiscus mealybugs in all stages of development. It is available commercially, but releases are not recommended except as a short-term solution, as it feeds on parasitized as well as nonparasitized mealybugs, and long-term control requires the establishment of the parasites.

The USDA Animal and Plant Health Inspection Service (APHIS), in cooperation with USDA Agricultural Research Service, USDA Forest Service, and others, has initiated a biological control program with the establishment of a parasite-rearing facility on St. Thomas, U.S. Virgin Islands. Both *A. kamali* and *G. indica* are being reared in the facility for distribution to other islands for establishment.

The Forest Service, through its Southern Region, Forest Health Protection, and the Forest Health Technology Enterprise Team staffs,

Main Plants Attacked by Pink Mealybug

Vegetables	Tree Crops	Forest Trees	Ornamentals
• Beans	• Avocado	• Blue mahoe	• Angelica
• Beetroot	• Breadfruit & breadnut	• Gliricidia	• Allamanda
• Cabbage	• Carambola	• Leucaena	• Anthurium
• Cucumber	• Citrus	• Samaan	• Bougainvillea
• Dasheen	• Cocoa	• Teak	• Croton
• Lettuce	• Damson		• Ginger lily
• Ochro	• Golden Apple	Weeds	• Heliconia
• Pepper	• Guava	• White tops	• Hibiscus
• Pumpkin	• Mango	• Pursley	• Ixora
• Tannia	• Passion fruit	• Stinging nettle	• Mussaenda
• Tomato	• Plum	• Vervine	• Oleander
	• Sorrel	• Sensitive plant	
	• Soursop	• Broom	
	• Sugar apple		
	• West Indian cherry		

AFTER A TABLE IN "THE PINK MEALYBUG IN THE CARIBBEAN", PUBLISHED BY THE REGIONAL ACTION PROGRAMME FOR CONTROL OF THE PINK MEALYBUG

See **More bugs**, page 8

Map projects look at past, present, and possible future

More and more, understanding and communicating information about forest health issues depend on the ability to display and analyze spatial data in the form of complex maps. The Enterprise Team is currently working with cooperators on two mapping projects that, although differing in scope, convey equally compelling messages about forest conditions.

Aerial survey mapping project

The aerial survey mapping project looks at the past and present from the vantage point of an aerial surveyor. For years, field personnel throughout the country have

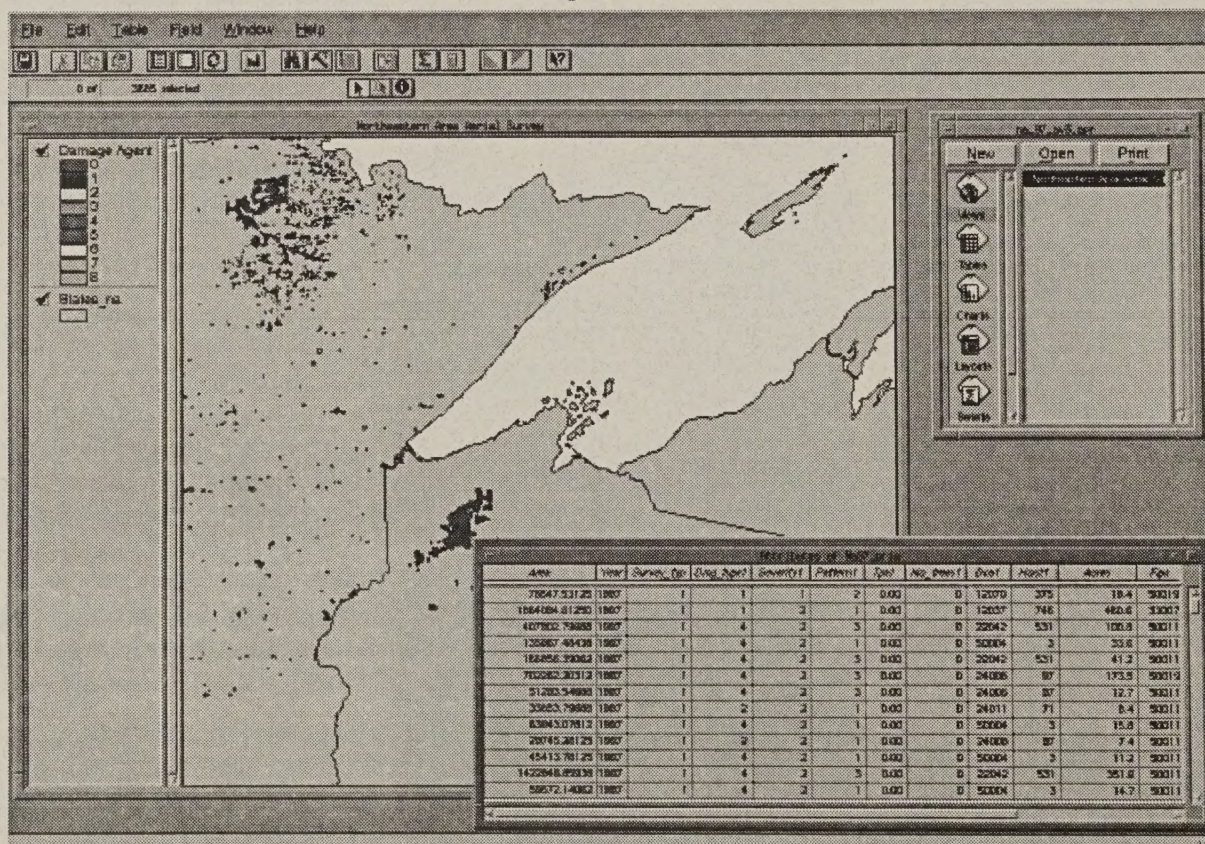
carried out aerial surveys of forest conditions. Each year Forest Service surveyors take to the skies to monitor insect and disease activity in each of the Forest Service Regions. The maps that result from these surveys contain a wealth of information about present forest conditions. While each Region collects data for its own purposes using different procedures, the basic information collected by all the Regions is similar in nature. It focuses on determining which insect or disease is responsible for observed damage at a particular point in time.

Ross Pywell, biological scientist with the Enterprise Team, is

interested in looking at this Regional information from a national perspective, bringing all the data together in a national database to see what scientists can learn from it.

Beginning in the 1998 aerial survey season, the Regions will submit their map data to the Enterprise Team, identifying damage agents using Pest Trend-Impact Plot System (PTIPS) codes for insects and diseases. This data will be used to explore options in database design, data storage, and data retrieval. Eventually, historic data will be added to the database.

See **Maps**, page 7



An example of aerial survey data from the Northeastern Area (Minnesota-Wisconsin). These and similar data from Forest Service Regions will be combined in a single database by means of the National Aerial Survey Mapping Project.

Maps, from page 6

Pywell envisions the project as a rich data source that may reveal previously unrecognized trends in insect and disease activity. The database may also help streamline the annual insect and disease conditions reporting process.

A look at forest health in the future

Where are major forest health problems now? Where are they likely to be in the future? Both forest managers and policy makers need answers. Though manageable at a local scale, the questions are more difficult to answer at a national scale. But policy makers must decide the appropriate allocation of funding at the national scale. That is why Ann Bartuska, director of Forest Health Protection, is interested in finding ways to identify on a national scale areas of our forests most at risk to disturbances.

If this information were readily available, the Forest Service could provide accurate and convincing evidence to guide policy makers. To get at the answers, the Forest Service gathered a team of experts to discuss and identify factors that contribute to the status of forest health. The experts identified insect and disease risk, fire risk, proximity to urban areas, and the presence of threatened and endangered species as major factors that affect forest health. They agreed that a geographical information systems (GIS) layer for each of these factors could greatly assist in identifying forested areas most at risk.

Joe Lewis, economist with the Forest Health Protection staff in Washington DC, assembled the first group of regional experts and began the process of identifying

areas at risk to insects and diseases. After the base cartographic information had been gathered, each Region was asked to map the areas it considered at risk. Much effort was focused on defining risk; the group concluded that the three categories of risk warranted three different maps. For this project, the categories are defined as follows:

- Risk of mortality: For this category, managers expect that a number greater than or equal to 25% of the host species will die within the next 15 years from agents such as gypsy moth in the East and mountain pine beetle in the West.
- Risk of growth loss : Managers expect that the host species in this category will suffer reductions in volume greater than or equal to 25% within the next 15 years from agents such as dwarf mistletoe and western spruce budworm.
- Special concern: Managers consider host species to be of special concern when they are minor components of the forest (less than 25%) but are of high ecological or aesthetic importance

to the surrounding community, such as flowering dogwood in the East.

Production of the GIS layer containing the insect and disease information is approaching completion. The new focus is the fire risk layer. Joe Lewis is working with researchers at the Intermountain Fire Sciences Laboratory in Missoula, Montana, to assemble a map of fire risk similar to the insect and disease risk map. Data is also being researched and identified for threatened and endangered species and for forests in proximity to urban areas. Although it will be some time before all layers are complete, Lewis feels that having the completed fire and insect and disease layers will go a long way toward enabling advisors to identify the areas most at risk for these major disturbances.

—Jeanine Paschke,
INTECS International, Inc.



Janiga earns award

Patrice Janiga, Operations Research Analyst with the Enterprise Team, was honored on June 11, 1998, with an award for outstanding service for supervising the Enterprise Team's Year 2000 compliance and for assuming additional duties during the vacancy of the Computer Specialist position on the Team. The award was presented by Borys M. Tkacz, Acting Director of Enterprise Team-Fort Collins.

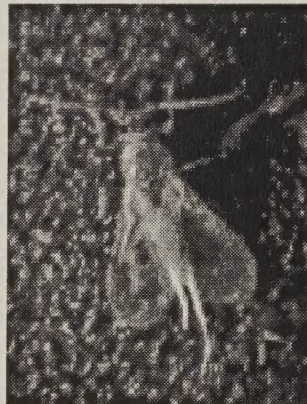


Patrice Janiga, USDA Forest Service, Forest Health Technology Enterprise Team-Fort Collins, earns outstanding service award.

More bugs, from page 5

is providing financial assistance to APHIS for parasite rearing, for translation (into Spanish) and publication of technology transfer documents for the general public, and for providing technical assistance to the Caribbean National Forest and the International Institute of Tropical Forestry in Puerto Rico.

USDA APHIS



Adult male pink hibiscus mealybug *Maconellicoccus hirsutus* (Green)

USDA APHIS



An adult female of the tiny parasite wasp *Anagyurus kamali* seeks out pink hibiscus mealybugs. Eggs laid in mealybug larvae hatch and feed on mealybug.

—Richard Reardon, USDA Forest Service, Enterprise Team
—Stephen Clarke, USDA Forest Service, Southern Region



Tkacz, from page 3

Tkacz: Absolutely. The Enterprise Team's services and products are very useful to managers who work to improve forest health.

Update: How much do field office personnel in Forest Health Protection (FHP) programs know about the Enterprise Team and its products and services?

Tkacz: In general, the Enterprise Team has done an excellent job of communicating its purpose to personnel in FHP programs. People involved in Enterprise Team projects are, of course, well aware of the Enterprise Team's work. But those not actively participating in projects may need more information. We need to keep up our outreach to these people. Outside FHP, for example, at National Forest system sites, land managers need more information about the Team's capabilities. We

must continue to work through Forest Health Protection to keep them informed. We need to use more informal ways of contacting potential clients rather than waiting for formal meetings. The *Update* is a good way of contacting users, but we need to work informally, too. Forest health personnel may be reluctant to call us with a question; we need to contact them.

**"I've been impressed . . .
with the array of
technologies that the
Enterprise Team is
involved in . . ."**

Update: Would you suggest any changes in Enterprise Team projects—new projects we ought to take on, projects we should continue, projects we ought to finish and put away?

Tkacz: The Team is on the right track. I've been impressed as Acting Director with the array of

technologies that the Enterprise Team is involved in. The scope of the Enterprise Team's work is broader than I realized as a client. There are potential pitfalls in this broad scope. It's important that we not dilute our efforts, that we stay focused on our core work as expressed in our strategic plan and our annual programs of work. We need to be selective in our enterprising efforts and make sure that any projects we undertake are building on our core capabilities and our competence to meet the overall mission of improving forest health technology. We began as a forest health team, and we need to keep our eyes on that mission.

Update: How can the Enterprise Team get the field manager's perspective on our work?

Tkacz: Ongoing communication at all levels of the organization is needed and will continue to be needed. Enterprise Team leadership needs to strengthen

See **Tkacz**, page 9

Tkacz, from page 8

communication with Forest Health Protection leadership in the Regions and Area. One problem pointed out at our recent Steering Committee meeting was the existence of some disconnection, director to director. This can be remedied by engaging FHP leaders in our work planning efforts more than we have been, and by getting their input at an earlier stage in the planning process. FHP Directors should be involved in setting our priorities if we are to assist in meeting their needs. They are among our most important clients in the long term.

“... the Enterprise Team has done an excellent job of communicating its purpose to personnel in FHP programs.”

Update: What are the most important aspects of the day-to-day work of forest health professionals in the field that we at the Enterprise Team need to keep in mind?

Tkacz: We need to be aware of issues facing forest health professionals, such as constraints on staffing, funding, and availability of adequate technology and tools. Given these constraints, we need to be active in finding ways the Enterprise Team can help make their jobs more efficient, less difficult. We need to understand assessment, monitoring, and analysis of forest health as performed by forest managers, and we need to focus Enterprise Team programs on developing useful tools for those purposes. We need to design tools that function under varying conditions; we need to continue to seek input on the realities faced every day by the

practitioners in the field; we need to keep abreast of their changing needs. Discussions at our annual Team Meeting in July will focus on seeking better ways to engage FHP directors, using all levels of communication, formal and informal.

Update: Have you had any surprises as Acting Director? What type of work takes most of your attention?

Tkacz: Acting as Director of the Enterprise Team-Fort Collins has been a very interesting opportunity for me. I've been impressed by the openness of the group here, by the good communication within the Team. I appreciate the difficulties for Enterprise Team staff and contractors in working with a series of leaders for the past year. But they've managed to keep the Team functioning through all these changes in leadership and despite critical vacancies. This is admirable. Each staff member or contractor knows where the Team as a whole has to go and how his or her own particular piece fits into the whole. The team will fare well, whoever sits in the conductor's seat. As for what type of work takes my attention, it changes by the minute! There are dozens of details over a broad range of work that must be dealt with.

Update: Any suggestions for the Enterprise Team's future?

Tkacz: Stay the course. Our basic structure, functioning in a team environment, is appropriate. Some corrections may be necessary to resolve emerging issues—but overall, the team concept is definitely the way to go for this outfit.

“We need to be aware of issues facing forest health professionals...”

Update: What aspects of being acting director have you enjoyed the most?

Tkacz: Working with the people. I knew many of the Enterprise Team members previously, from working with them as a cooperator on projects. But that's not the same as working with people on a day-to-day basis. I have really enjoyed getting to know in more detail what the Enterprise Team does, and I'm impressed with the variety of our projects and capabilities.

Update: What can individual team members do to best serve our clients?

Tkacz: We need to communicate our mission and our products and services one on one with our counterparts in the Regions and Area. We need to deal with disconnections at every level, on an informal as well as a formal basis. We will all be better off for resolving these issues—the field practitioners, the Enterprise Team, and the Forest Service organization as a whole.

□



Recent Publications

Summer 1998

Enterprise Team publications

FHTET 96-21 Bellows, T; Meisenbacher, C.; Reardon, R. 1998. Biological control of arthropod forest pests of the western United States: A review and recommendations. FHTET 96-21. Morgantown, WV: USDA Forest Service, State & Private Forestry, Forest Health Protection, Forest Health Technology Enterprise Team. 96 p.

Abstract

This publication summarizes the literature on the population biology and natural enemy relationships for 46 of the more serious arthropod pests of western forests. It presents possibilities for enhancing the use of, or reliance on, natural enemies of these pests for control.

FHTET 97-11 Reardon, R.; Hajek, A. 1998. The gypsy moth fungus *Entomophaga maimaiga* in North America. FHTET 97-11. Morgantown, WV: USDA Forest Service, State & Private Forestry, Forest Health Protection, Forest Health Technology Enterprise Team. 22 p.

Abstract

An update of NA-TP-15-93, *Entomophaga maimaiga* in North America: A review, published in September, 1993, this publication includes new information on the biology, population dynamics, nontarget impacts, and use of *E. maimaiga* as a mycoinsecticide.

FHTET 97-27 Fuxa, J.; Ayyappath, R.; Goyer, R. 1998. Pathogens and microbial control of North American forest insect pests. FHTET 97-27. Morgantown, WV: USDA Forest Service, State & Private Forestry, Forest Health Protection, Forest Health Technology Enterprise Team. 150 p.

Abstract

This publication gives the status of infectious diseases and microbial control of 76 forest pests in North America and presents a system for researchers to utilize in prioritizing pathogen species for further study in microbial control.

FHTET 98-09 Autometric Service Company; Riffe, Mark W.; Shewmaker, Kaye; INTECS International, Inc.; Marston, Jonathan D.; USDA Forest Service: Williams, Stephen B.; Twombly, Eric D.; Perisho, Ronald J. 1998. INFORMS Version 1.1 Users Guide. FHTET 98-09. Fort Collins, CO: USDA Forest Service, State & Private Forestry, Forest Health Protection, Forest Health Technology Enterprise Team. 260 p.

Abstract

This users guide was prepared by the USDA Forest Service for use with the Integrated Forest Resource Management System (INFORMS). Use of this INFORMS documentation should be augmented with appropriate manuals for Oracle and ArcView products.

Other publications

Teske, M.E.; Thistle, H.W. 1998. Drop size scaling of agricultural spray material by dimensional analysis. Presented at ILASS Americas, 11th Annual International Conference on Liquid Atomization and Spray Systems; 1998 May; Sacramento, CA.

Abstract

The recent availability of a large agricultural atomization database (generated by the Spray Drift Task Force) enables the application of dimensional analysis to deconstruct drop size distribution and recover nondimensional parameters responsible for the character of the distributions themselves. Both Newtonian and non-Newtonian behavior are encompassed within this database. Dimensional analysis results may be compared with alternate methods: A statistical approach using regression analysis, and a neural network representation of the database. The alternate methods do not provide the obvious physical insight generated by dimensional analysis but may more easily represent non-Newtonian effects.

MacNichol, A.Z., Teske, M.E. and Barry, J.W. 1997. A technique to characterize spray deposit in orchard and tree canopies. Transactions of the ASAE, Vol. 40(6):1529-1536. 8 p.

Abstract

This article evaluates drop deposition data from the sides of beverage can samplers wrapped with KromekoteR paper placed throughout a broadleaf (almond) canopy at three stages of foliage development. Some measure of foliage coverage uniformity is necessary to evaluate application quality and to improve methods of aerial application. Uniformity of coverage is found from drop data on target elements, while potential biological effectiveness is a measure of insect mortality, and must be either assumed or determined in the field or laboratory by biological assessment.

Data from two field studies conducted by the USDA Forest Service at Hennigan Orchard in Chico, California, in 1985 and 1994, are used to evaluate the amount and uniformity of spray droplet coverage on the can samplers. A quantitative representation of coverage (called the Relative Index) is developed to describe the drop deposition on the samplers and is then used to determine the spray deposition coverage produced by the various spray application systems tested.

The overall performance of two types of spray systems is evaluated in terms of delivering spray on target at different canopy elevations. Conclusions: (1) The Relative Index formula developed herein for assessing drop recoveries on sides of beverage cans correlates data from all trials. (2) The placement of beverage can samplers spatially across the orchard and at different elevations gives a good representation of the effects of spraying the canopy in both field studies. (3) Helicopter spray system applications show greater uniformity of deposit on the sides of the beverage cans than the fixed-wing aircraft system applications. (4) Micronair atomizers spraying low rate produce less coverage on the sides of the can samplers at all elevations in the canopy than the other spray systems tested in these field studies.

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Ellenwood leads remote sensing program

Enterprise Team projects for Remote Sensing will be getting a boost with the addition of Jim Ellenwood, formerly Geographic Information Systems specialist with the USDA Forest Service Regional Ecosystem Office in Portland, Oregon, recently appointed Remote Sensing Program Manager for the Team. He fills the position left vacant by the retirement of Richard Myhre.

Ellenwood's first priorities will be to shepherd the completion of software that enables airborne video users to automosaic images and align video clips with geographic locations and themes stored in their Geographic Information Systems (GIS). The automosaicking system, under development for several years, is nearly ready for prime time.

The next steps, finalizing the system and transferring it to field application, will be coordinated with the Forest Service Remote Sensing Applications Center (RSAC) in Salt Lake City, UT. The Center, sponsored by the agency director for Engineering, has long been a partner with the Enterprise Team in remote sensing evaluation, technology transfer, and training programs. Ellenwood will serve as primary contact and liaison with RSAC.

In addition to serving as GIS specialist for the Regional Ecosystem Office, Ellenwood's experience includes working in the Southwest as GIS and Resource Information Manager, Silviculturist, and Timber Planner on the Kaibab National Forest. He was also detailed as Regional Silviculturist

and worked as Tribal Forester on the San Carlos Indian Reservation. Ellenwood has extensive experience in the application of remote sensing to the management of natural resources, including analyses of landscapes utilizing satellite imagery and airborne videography.

No stranger to the Enterprise Team, Ellenwood has worked as a cooperator with Forest Health Protection and the Team on many projects, including Forest-wide risk assessments of insects, diseases, and fire. Most recently, he assisted the Team in conducting an intensive, three-week training session on Airborne Videography for the Anhui Province Forest Biological Control Center in Hefei, People's Republic of China.

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Team's web site gets new address

The Enterprise Team homepage has a new look AND a new location. Our local server in Fort Collins, set up mostly as a test site, has experienced growing pains and network maladies. After a recent upgrade in equipment, the Washington office web server can now accommodate more sites, so we made the move in May. If you visited our site before, you may

notice a slight change in organization. We hope the changes make it easier to find the information you're looking for. Set your bookmark and check back often; we hope to add new information on a regular basis. Look for us at <http://www.fs.fed.us/foresthealth/technology/fhtet.html>.

